

## CHAPTER 3. DESCRIPTION OF TOOLS

### 3.1 Android

Android is a mobile operating system developed by Google, based on a modified version of the Linux kernel and other open source software and designed primarily for touch screen mobile devices such as smart phones and tablets. In addition, Google has further developed Android TV for televisions, Android Auto for cars, and Wear OS for wrist watches, each with a specialized user interface.

Variants of Android are also used on game consoles, digital cameras, PCs and other electronics. Initially developed by Android Inc., which Google bought in 2005, Android was unveiled in 2007, with the first commercial Android device launched in September 2008. The operating system has since gone through multiple major releases, with the current version being 8.1 "Oreo", released in December 2017.

Android has been the best-selling OS worldwide on smart phones since 2011 and on tablets since 2013. As of May 2017, it has over two billion monthly active users, the largest installed base of any operating system, and as of 2017, the Google Play store features over 3.5 million apps. Android Inc. was founded in Palo Alto, California in October 2003 by Andy Rubin, Rich Miner, Nick Sears, and Chris White. Rubin described the Android project as "tremendous potential in developing smarter mobile devices that are more aware of its owner's location and preferences".<sup>[15]</sup> The early intentions of the company were to develop an advanced operating system for digital cameras, and this was the basis of its pitch to investors in April 2004. The company then decided that the market for cameras was not large enough for its goals, and by five months later it had diverted its efforts and was pitching Android as a handset operating system that would rival Symbian and Microsoft Windows Mobile.<sup>[16][17]</sup> Rubin had difficulty attracting investors early on. From 2008 to 2013, Hugo Barra served as product spokesperson, representing Android at press conferences and Google I/O, Google's annual developer-focused conference. He left Google in August 2013 to join Chinese phone maker Xiaomi.<sup>[3]</sup> Less than six months earlier, Google's then-CEO Larry Page announced in a blog post that Andy Rubin had moved from the Android division to take on new projects at Google, and that Sundar Pichai would become the new Android lead.<sup>[4]</sup> Pichai himself would eventually switch positions, becoming the new CEO of Google in August 2015 following the company's restructure into the Alphabet conglomerate, making Hiroshi Lockheimer the new head of Android. In June 2014, Google announced Android One, a set of "hardware reference models" that would "allow [device makers] to easily create high-quality phones at low costs", designed for consumers in developing countries. In September, Google announced the first set of Android One phones for release in India. However, Recode reported in June 2015 that the project was "a disappointment", citing "reluctant consumers and manufacturing partners" and "misfires from the search company that has never quite cracked hardware. In 2010, Google launched its Nexus series of devices, a lineup in which Google partnered with different device manufacturers to produce

new devices and introduce new Android versions. The series was described as having "played a pivotal role in Android's history by introducing new software iterations and hardware standards across the board", and became known for its "bloat-free" software with "timely [...] updates".[35] At its developer conference in May 2013,

Google announced a special version of the Samsung Galaxy S4, where, instead of using Samsung's own Android customization, the phone ran "stock Android" and was promised to receive new system updates fast.[3] The device would become the start of the Google Play edition program, and was followed by other devices, including the HTC One Google Play edition,[7] and Moto G Google Play edition. In 2015, Ars Technica wrote that "Earlier this week, the last of the Google Play edition Android phones in Google's online storefront were listed as "no longer available for sale"" and that "Now they're all gone, and it looks a whole lot like the program has wrapped up.[7][8] Plans to prelaunch Android One surfaced in August 2015 with Africa announced as the next location for the program a week later. receive new system updates fast.[3] The device would become the start of the Google Play edition program, and was followed by other devices, including the HTC One Google Play edition, and Moto G Google Play edition. In 2015, Ars Technica wrote that "Earlier this week, the last of the Google Play edition Android phones in Google's online storefront were listed as "no longer available for sale"" and that "Now they're all gone, and it looks a whole lot like the program has wrapped up. [8][9][10]

### 3.2 Android Studio

Android studio is a replacement for the Eclipse Android Development Tools (ADT) as primary IDE for native Android application development. Android Studio was announced on May 16, 2013 at the Google I/O conference. It was in early access preview stage starting from version 0.1 in May 2013, then entered beta stage starting from version 0.8, which was released in June 2014.<sup>[10]</sup> The first stable build was released in December 2014, starting from version 1.0.<sup>[11]</sup> The current stable version is 3.0 released in October 2017. **Android Studio** is the official<sup>[6]</sup> integrated development environment for Google Android Studio is the official Integrated Development Environment (IDE) for Android app development, based on IntelliJ IDEA. On top of IntelliJ's powerful code editor and developer tools, Android Studio offers even more features that enhance your productivity when building Android apps.

The Android project structure on disk differs from this flattened representation. To see the actual file structure of the project, select Project from the Project dropdown (in figure 1, it's showing as Android). You can also customize the view of the project files to focus on specific aspects of your app development. For example, selecting the Problems view of your project displays links to the source files containing any recognized coding and syntax errors, such as a missing XML element closing tag in a layout file. Android Studio supports all the same programming languages of IntelliJ, and Python, and Kotlin;<sup>[4]</sup> and Android Studio 3.0 supports "Java 7 language features and a subset of Java 8 language features that vary by platform version The following features are provided in the current stable version Gradle-based build support Android-specific refactoring and quick fixes Lint tools to catch performance, usability, version compatibility and other problems ProGuard integration and app-signing capabilities Template-based wizards to create common Android designs and components A rich layout editor that allows users to drag-and-drop UI components, option to preview layouts on multiple screen configurations<sup>[4]</sup> Support for building Android Wear apps Built-in support for Google Cloud Platform, enabling integration with Firebase Cloud Messaging (Earlier 'Google Cloud Messaging') and Google App Engine<sup>[5]</sup> Android Virtual Device (Emulator) to run and debug apps in the Android studio. Android Studio is the official Integrated Development Environment (IDE) for Android app development, based on IntelliJ IDEA.

On top of IntelliJ's powerful code editor and developer tools, Android Studio offers even more features that enhance your productivity when building Android apps, such as:

- 1 A flexible Gradle-based build system
- 2 A fast and feature-rich emulator
- 3 A unified environment where you can develop for all Android devices
- 4 Instant Run to push changes to your running app without building a new APK
- 5 Code templates and GitHub integration to help you build common app features
- 6 Extensive testing tools and frameworks
- 7 Lint tools to catch performance, usability, version compatibility, and other problems
- 8 C++ and NDK support
- 9 Built-in support for Google Cloud Platform, making it easy to integrate Google Cloud

### 3.3 Firebase

**Firebase** is a mobile and web application development platform developed by Firebase, Inc. in 2011, then acquired by Google. Firebase evolved from Evolve, a prior startup founded by James Templin and Andrew Lee in 2011. Evolve provided developers an API that enables the integration of online chat functionality into their websites. After releasing the chat service, Templin and Lee found that it was being used to pass application data that were not chat messages. Developers were using Evolve to synchronize application data such as game state in real time across their users. Templin and Lee decided to separate the chat system and the real-time architecture that powered it.

#### Firestore Auth

Firestore Auth is a service that can authenticate users using only client-side code. It supports social login providers Facebook, GitHub, Twitter and Google (and Google Play Games). Additionally, it includes a user management system whereby developers can enable user authentication with email and password login stored with Firestore.<sup>[16]</sup>

#### Real-time Database

Firestore provides a real-time database and backend as a service. The service provides application developers an API that allows application data to be synchronized across clients and stored on Firestore's cloud. The company provides client libraries that enable integration with Android, iOS, JavaScript, Java, Objective-C, Swift and Node.js applications. The database is also accessible through a REST API and bindings for several JavaScript frameworks such as Angular, React, Ember.

#### Firestore Storage

Firestore Storage provides secure file uploads and downloads for Firestore apps, regardless of network quality. The developer can use it to store images, audio, video, or other user-generated

automatic reports, developer can log custom events to help capture the steps leading up to a crash.<sup>[24]</sup> Before acquiring Crashlytics, Firestore was using its own Firestore Crash Reporting.

Firestore Performance provides insights into an app's performance and the latencies the app's user's experience.

### 3.4 Java for Android

Android software development is the process by which new applications are created for devices running the Android operating system. Officially, apps can be written using Java, C++ or Kotlin using the Android software development kit (SDK). Third party tools, development environments and language support have also continued to evolve and expand since the initial SDK was released in 2008.

The Android software development kit (SDK) includes a comprehensive set of development tools.<sup>[5]</sup> These include a debugger, libraries, a handset emulator based on QEMU, documentation, sample code, and tutorials. Currently supported development platforms include computers running Linux (any modern desktop Linux distribution), Mac OS X 10.5.8 or later, and Windows 7 or later. As of March 2015, the SDK is not available on Android itself, but software development is possible by using specialized Android applications.<sup>[6][7][8]</sup>

Until around the end of 2014, the officially supported integrated development environment (IDE) was Eclipse using the Android Development Tools (ADT) Plugin, though IntelliJ IDEA IDE (all editions) fully supports Android development out of the box,<sup>[9]</sup> and NetBeans IDE also supports Android development via a plugin.<sup>[10]</sup> As of 2015, Android Studio,<sup>[11]</sup> made by Google and powered by IntelliJ, is the official IDE; however, developers are free to use others, but Google made it clear that ADT was officially deprecated since the end of 2015 to focus on Android Studio as the official Android IDE.<sup>[12]</sup> Additionally, developers may use any text editor to edit Java and XML files, then use command line tools (Java Development Kit and Apache Ant are required) to create, build and debug Android applications as well as control attached Android devices (e.g., triggering a reboot, installing software package(s) remotely).<sup>[13][6]</sup>

### 3.5 XML for Android

In computing, Extensible Markup Language (XML) is a markup language that defines a set of rules for encoding documents in a format that is both human-readable and machine-readable. The W3C's XML 1.0 Specification<sup>[2]</sup> and several other related specifications<sup>[3]</sup>—all of them free open standards—define XML.<sup>[4]</sup> The design goals of XML emphasize simplicity, generality, and usability across the Internet.<sup>[5]</sup> It is a textual data format with strong support via Unicode for different human languages. Although the design of XML focuses on documents, the language is widely used for the representation of arbitrary data structures<sup>[6]</sup> such as those used in web services. Several schema systems exist to aid in the definition of XML-based languages, while programmers have developed many application programming interfaces (APIs) to aid the processing of XML data. The essence of why extensible markup languages are necessary is explained at *Markup language* (for example, see *Markup language § XML*) and at *Standard Generalized Markup Language*. Hundreds of document formats using XML syntax have been developed,<sup>[7]</sup> including RSS, Atom, SOAP, SVG, and XHTML. XML-based formats have become the default for many office-productivity tools, including Microsoft Office (Office Open XML), OpenOffice.org and LibreOffice (OpenDocument), and Apple's iWork<sup>[citation needed]</sup>. XML has also provided the base language for communication protocols such as XMPP. Applications for the Microsoft .NET Framework use XML files for configuration. Apple has an implementation of a registry based on XML.<sup>[8]</sup> Most industry data standards, e.g. HL7, OTA, NDC, FpML, MISMO etc. are based on XML and the rich features of the XML schema